CLAIMS

What is claimed is:

1. Retroreflective sheeting, comprising:
   a) a plurality of open-faced cube-corner surfaces formed from a substantially rigid material to keep the cube-corner surfaces from flexing;
   b) an optical coating formed on the surfaces; and
   c) a fill layer attached to at least a portion of the optical coating.

2. The sheeting of claim 1, wherein the optical coating includes a specular coating.

3. The sheeting of claim 1, wherein the optical coating includes a low index of refraction dielectric material.

4. The sheeting of claim 3, wherein the index of refraction is in the range of between about 1.1 and 1.3.

5. The sheeting of claim 1, wherein the substantially rigid material is selected from a group consisting of thermoplastic and thermoset polymers.

6. The sheeting of claim 5, wherein the polymers further include a filler which is selected from a group consisting of glass, graphite, polymers, and metals.

7. The sheeting of claim 1, wherein the fill layer is an electrooptic composition.

8. The sheeting of claim 7, further including a top carrier sheet above the fill layer, the top carrier sheet being conductive for allowing an electrical charge to pass between the top carrier sheet and the optical coating.

9. The sheeting of claim 8, wherein the top carrier sheet includes a transistor pattern.

10. The sheeting of claim 7, further including a top carrier sheet above the fill layer, the top carrier sheet being conductive, and a bottom carrier sheet under the open-faced cube-corner surfaces, the bottom carrier sheet also being conductive for allowing an electrical charge to pass between the top carrier sheet and the bottom carrier sheet.

11. The sheeting of claim 1, wherein a plurality of voids form the open-faced cube-corner surfaces.

12. The sheeting of claim 11, wherein each void includes three surfaces which meet at a nadir.

13. The sheeting of claim 1, further comprising a color coating on at least some of the surfaces.

14. The sheeting of claim 1, wherein the fill layer is substantially transparent.

15. The sheeting of claim 14, further comprising a top coat covering the fill layer.

16. The sheeting of claim 14, wherein the fill layer has an index of refraction in the range of between about 1.5 and 1.65.

17. The sheeting of claim 1, wherein the fill layer has an application viscosity less than or equal to 1,000 centipoise.

18. The sheeting of claim 1, wherein the sheeting is formed into chips.

19. The sheeting of claim 1, wherein the cube-corner surfaces are formed on a carrier substrate.

20. The sheeting of claim 19, wherein a second layer of retroreflective cube-corner surfaces is formed on a back side of the carrier substrate such that a first layer of retroreflective open-faced cube-corner surfaces and the second layer of retroreflective open-faced cube-corner surfaces are back to back with the respective open-faced surfaces facing away from each other.

21. The sheeting of claim 20, wherein the carrier substrate is breakable into chips having back to back retroreflective sheetings thereon.

22. The sheeting of claim 1, further comprising patterns on the retroreflective sheeting having no open-faced cube-corner surfaces.

23. The sheeting of claim 22, wherein:

the cube-corner surfaces are formed on a carrier substrate; and

the patterns form walls in the retroreflective sheeting that extend from the carrier substrate to a prism ridge, the thickness of the walls being in the range of between about 25.4 and 1,270 microns (0.001 and 0.05 inches).

24. A projection screen which includes the retroreflective sheeting of claim 1.

25. Retroreflective sheeting, comprising:

a) a plurality of three-sided indentations which form open-faced cube-corners;

b) a reflective coating formed on the three-sided indentations; and

c) a fill layer attached to at least a portion of the reflective coating.

26. The sheeting of claim 25, further comprising a carrier sheet supporting the open-faced cube-corners.

27. The sheeting of claim 25, wherein the fill layer has an index of refraction in the range of between about 1.5 and 1.65.

28. The sheeting of claim 25, further comprising a top coat covering the fill layer.

29. The sheeting of claim 25, wherein the cube-corner surfaces are formed on a carrier substrate.

30. The sheeting of claim 29, wherein a second layer of retroreflective open-faced cube-corner surfaces is formed on a back side of the carrier substrate such that a first layer of open-faced cube-corner surfaces and the second layer of retroreflective open-faced cube-corner surfaces are back to back with the respective open-faced surfaces facing away from each other.

31. The sheeting of claim 25, further comprising patterns in the retroreflective sheeting having no open-faced cube-corner surfaces.

32. Retroreflective sheeting, comprising:

a) a polymer structure having a plurality of open-faced cube-corner surfaces formed therein;

b) a metal layer formed on the surfaces; and

c) a substantially transparent fill coat covering at least a portion of the metal layer, the fill coat having a low glass transition temperature.

33. The sheeting of claim 32, wherein the fill coat has an index of refraction in the range of between about 1.5 and 1.65.

34. A method for forming retroreflective sheeting, comprising:

a) forming a plurality of open-faced cube-corner surfaces from a substantially rigid material to keep the cube-corner surfaces from flexing;

b) forming a specular coating on the surfaces; and

c) attaching a fill layer to at least a portion of the specular coating.

35. The method of claim 34, further comprising the step of forming the cube-corner surfaces on a carrier film.

36. The method of claim 35, further comprising the step of forming a second layer of retroreflective open-faced cube-corner surfaces on a back side of the carrier film such that a first layer of retroreflective open-faced cube-corner surfaces and the second layer of retroreflective open-faced cube-corner surfaces are back to back with the respective open-faced surfaces facing away from each other.

37. The method of claim 35, further comprising the step of continuously forming the cube-corner surfaces on the carrier film.

38. The method of claim 34, further comprising the step of forming the sheeting into chips.

39. The method of claim 34, further comprising the step of forming a top coat over the fill layer.

40. The method of claim 34, further comprising the step of forming a color coating on at least some of the surfaces.

41. The method of claim 34, wherein the fill layer comprises a material with an application viscosity of less than or equal to about 1,000 centipoise.

42. The method of claim 34, further comprising the step of forming the open-faced cube-corner surfaces on a back side of traditional retroreflective sheeting having cube-corner prisms, the open-faced cube-corner surfaces and the cube-corner prisms facing away from each other.

43. A method for forming open-faced retroreflective sheeting, comprising:

a) forming a mold by forming three sets of grooves, the grooves intersecting at an angle to form a plurality of prisms, each prism having a base and three intersecting lateral faces which meet at an apex;

b) forming the retroreflective sheeting on the mold to form a mirror image of the mold wherein the resulting sheeting includes a plurality of three-sided indentations which form open-faced cube-corner surfaces;

c) coating the open-faced cube-corner surfaces with an optical coating; and

d) attaching a fill layer to at least a portion of the optical coating.

44. Retroreflective chips comprising open-faced cube-corner surfaces having an optical coating thereon.

45. The retroreflective chips of claim 44, further comprising second cube-corner surfaces having specular coating thereon laminated to a back side of the first open-faced cube-corner surfaces such that the respective open-faced surfaces face away from each other.

46. The retroreflective chips of claim 44, further comprising a color coating on at least some of the surfaces.

47. The retroreflective chips of claim 44, further comprising a fill layer attached to at least a portion of the optical coating, the fill layer having an index of refraction in the range of between about 1.5 and 1.65.

48. The retroreflective chips of claim 44, wherein the open-faced cube-corner surfaces include different size surfaces on the chips.

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